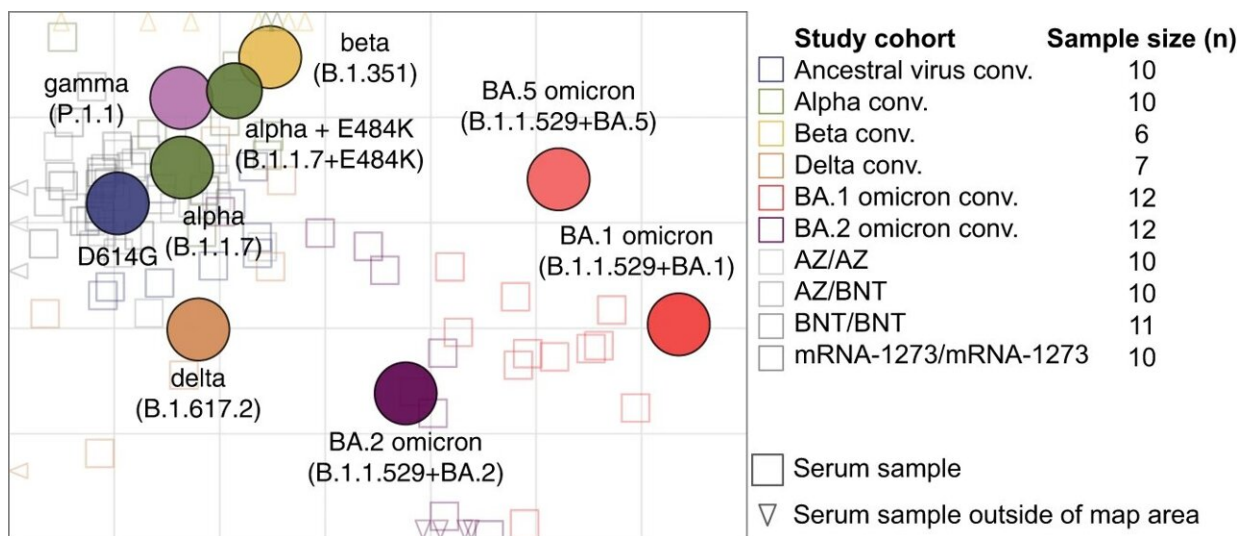


# 'Cocktail' vaccines could offer increased protection against future COVID-19 variants of concern

December 14 2022



Antigenic map of SARS-CoV-2 variants constructed from single exposure convalescent and double vaccinated sera. Virus variants are shown as colored circles, sera as open squares with the color corresponding to the infecting variant. Triangles indicate sera positioned outside the central map area and point in the direction where the corresponding serum is positioned. Vaccine sera are shown in gray tones (from dark to light: mRNA-1273/mRNA-1273  $n = 10$ , BNT162b2/BNT162b2 (*BNT/BNT*)  $n = 11$ , ChAdOx-S1/BNT162b2 (*AZ/BNT*)  $n = 10$ , ChAdOx-S1/ChAdOx-S1 (*AZ/AZ*)  $n = 10$ ). The alpha + E484K variant is shown as smaller circle due to its additional substitution compared to the alpha variant. The x- and y-axis represent antigenic distances with one grid square corresponding to one two-fold serum dilution of the neutralization titer. The map orientation within x- and y-axis is free as only relative distances can be inferred..

Only single-variant exposure sera have been used for construction of the map.  $n = 2$  beta convalescent and  $n = 6$  BA.1 convalescent samples could not be positioned in the map because of too many

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